

Title: **Separation of High LOI Fly Ash**

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Summary

The utilization of combustion byproducts, in particular fly ash, has an important impact on the cost and environmental impact of power production from coal. Improved beneficiation and utilization schemes for high loss-on-ignition (LOI) fly ash can transform this combustion byproduct from a waste material, with associated disposal costs, to a valuable product. The utilization of power-plant-derived fly ash has been impacted by recent shifts to low-NO_x burners which can increase the carbon content of the ash above the specification for its use in Portland cement. The ability to efficiently extract high purity carbon or ash is important in the development and application of cost-effective beneficiation technologies for the production of value-added products. A focus of NETL's in-house research effort is to develop technologies for separation of the inorganic and unburned carbon phases in pulverized coal combustor fly ashes. Research activities in this area involved performing separations of combustion byproducts using the combination of ultrasonic sieving and dry triboelectrostatic separation.

The constituents of fly ash vary in size (most of unburned carbon is contained in the larger size fraction of the fly ash as opposed to minerals), density, electrostatic, physical, and chemical properties making the separation of the fly ash a very difficult task. However, a systematic combination of separation techniques based on the differences in size, density, electrostatic, and physical properties may achieve the difficult separation task of extracting valuable products from fly ash.

Recently, a dry ultrasonic sieving of the fly ash obtained from Gulf Power was conducted on the as-received samples prior to triboelectrostatic separation. It was observed that a simple size separation via ultrasonic sieving could generate samples with various carbon content. Subsequently, triboelectrostatic separations were conducted on these separated samples. The results suggested that the final carbon content in the products can be fine-tuned with the combination of dry ultrasonic sieving and triboelectrostatic separation. In addition to fly ash acquired from Gulf Power, the fly ashes obtained from Shawville and American Electric power plants were also studied.